Behavior and fate of nanoparticles in soil

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Abstract

Since metallic nanoparticles are widely used nowadays in industrial applications of nanotechnology, there is every possibility that they find their way into soils, especially through sewage sludge. Nanoparticle properties (e.g., size, shape, and surface charge) and those of the soil environment (e.g., pH, ionic strength, and clay content) affect the physical and chemical processes that lead to the dissolution, aggregation, and agglomeration of nanoparticles. This is while some of these specific interactions, particularly the roles played by different DOMs in the direct uptake of nanoparticles by soil organisms and the availability of different forms of engineered nanoparticles, have been scarcely ever investigated. Nanoparticulate mobility and bioavailability to microorganisms control their behavior in soil. However, little is known about the effects of dissolution, aggregation, and agglomeration processes on the toxicity of nanoparticles. Moreover, conflicting results have been reported by most studies, making it difficult to derive a clear picture of the processes involved. The present study provides an overview of the fate and transport of metal nanoparticles in soil.

Keywords: Bioavailability, Nanoparticles, Particle size, Surface charge.

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